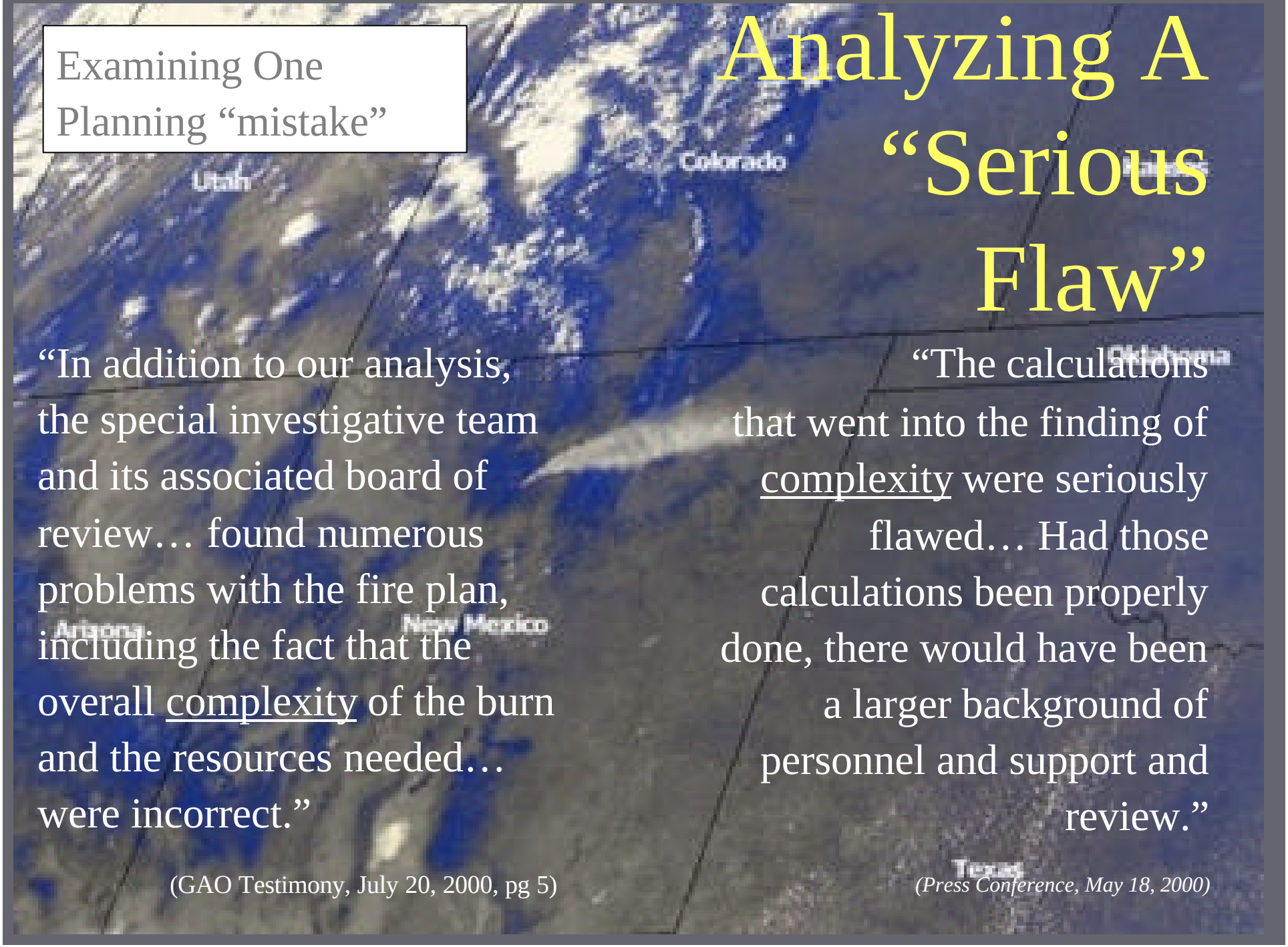


Examining One Planning "mistake"

Analyzing A "Serious Flaw"

"In addition to our analysis, the special investigative team and its associated board of review… found numerous problems with the fire plan, including the fact that the overall complexity of the burn and the resources needed… were incorrect."

(GAO Testimony, July 20, 2000, pg 5)

"The calculations that went into the finding of complexity were seriously flawed… Had those calculations been properly done, there would have been a larger background of personnel and support and review."

(Press Conference, May 18, 2000)

Analysis of a “Serious Flaw”

What Exactly Was the “Serious Flaw?”

What Is “Complexity?”

Planning For Complexity

What’s Wrong With Complexity?

Conclusions

Discussion of these Topics Follow in Order

What Was The Serious Flaw?

Complexity Ranges:

Low	40-90
Moderate	91-140
High	141-200

Complexity Value	Bandelier Plan	Process Guideline
Low	1	1
Moderate	2	3
High	3	5

Complexity Element	Weighting Factor	Complexity Value	Total Points
Safety	5	2	10
Threats to Boundaries	5	2	10
Fuels and fire Behavior	5	2	10
Objectives	4	2	8
Management Organization	4	2	8
Improvements	3	2	6
Natural, Cultural, Social Va	3	2	6
Air Quality Values	3	2	6
Logistics	3	3	9
Political Concerns	2	3	6
Tactical Operations	2	3	6
Interagency Coordination	1	2	2
	Total Complexity Points:		87

134

"The calculations that went into the finding of complexity were seriously flawed… Had those calculations been properly done, there would have been a larger background of personnel and support and review."

What Is Complexity?
Used 60 times in the Policy Guide (172 pgs.)

COMPLEXITY:

Page 45[1] -- "Potential complexity is an estimate of complexity."

Page 77[1] -- "Complexity: Identification of the level of complexity of the prescribed fire."

Chapter 2, Pg 4[2]-- "…Complexity Analysis - The formal process to determine the full complexity rating… 12 variables…"

[1] Wildland and Prescribed Fire Policy: Implementation Procedures and Implementation Guide, August 1998.

[2] Wildland Fire Management RM – 18, NPS, March 1999

Planning For Complexity

- Safety
- Boundary Threats
- Fire Behavior
- Objectives
- Management Organization
- Improvements
- Natural, Cultural, Social Values
- Air Quality Values
- Logistics
- Political Concerns
- Tactical Operations
- Interagency Coordination

Potential Complexity

- Fire Danger Indicator
- Fire Size
- Time of Season

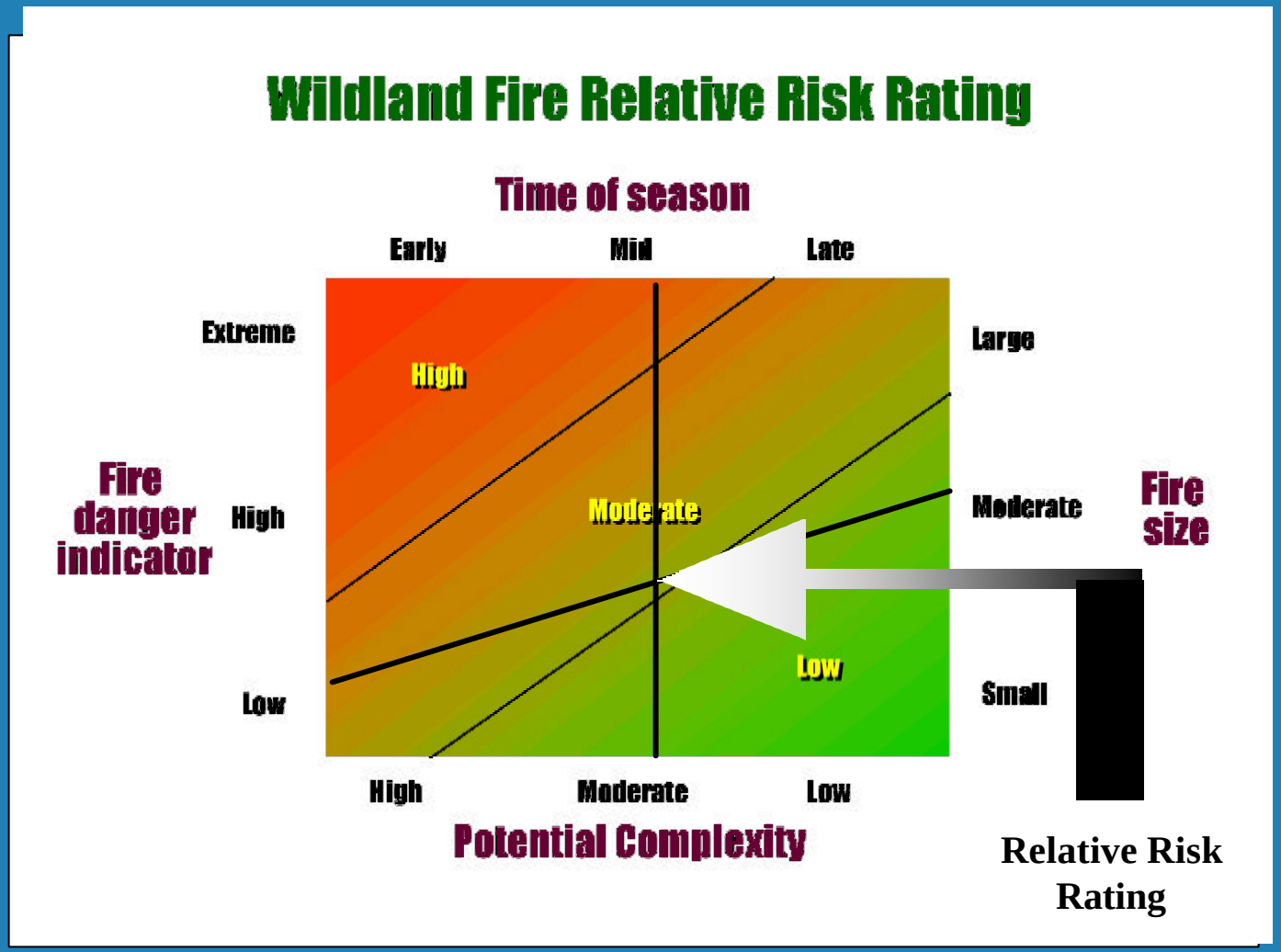
Relative Risk Rating

"Relative Risk Rating can be used to obtain a subjective assessment of the risk"[1]

Relationship Between Relative Risk Rating and Prescribed Burn Planning Decisions (i.e., Resources, Contingencies, Management Expertise, Costs, Go/No Go Decisions, etc.) Is Not Specified, Defined, Illustrated, or Noted in the Referenced Documentation.

[1] Wildland and Prescribed Fire Management Policy: Implementation Procedures, Reference Guide, August 1998, pg. 43

Complexity And Relative Risk



How Was Complexity Used By Bandelier For Planning?

Complexity Estimation →

1. Burn Unit Description
2. Goals and Objectives
3. Range of Acceptable Results
4. Project Assessment
5. Implementation Actions
6. Cooperation and Public Information
7. Contingency Plan
8. Funding
9. Smoke Management and Air Quality
10. Monitoring
11. Post Burn Activities

(Bandelier Burn Plan*)

*Consistent with Policy Guidelines dated August 1998

How Was Complexity Used By Bandelier For Planning?

Complexity Estimation →

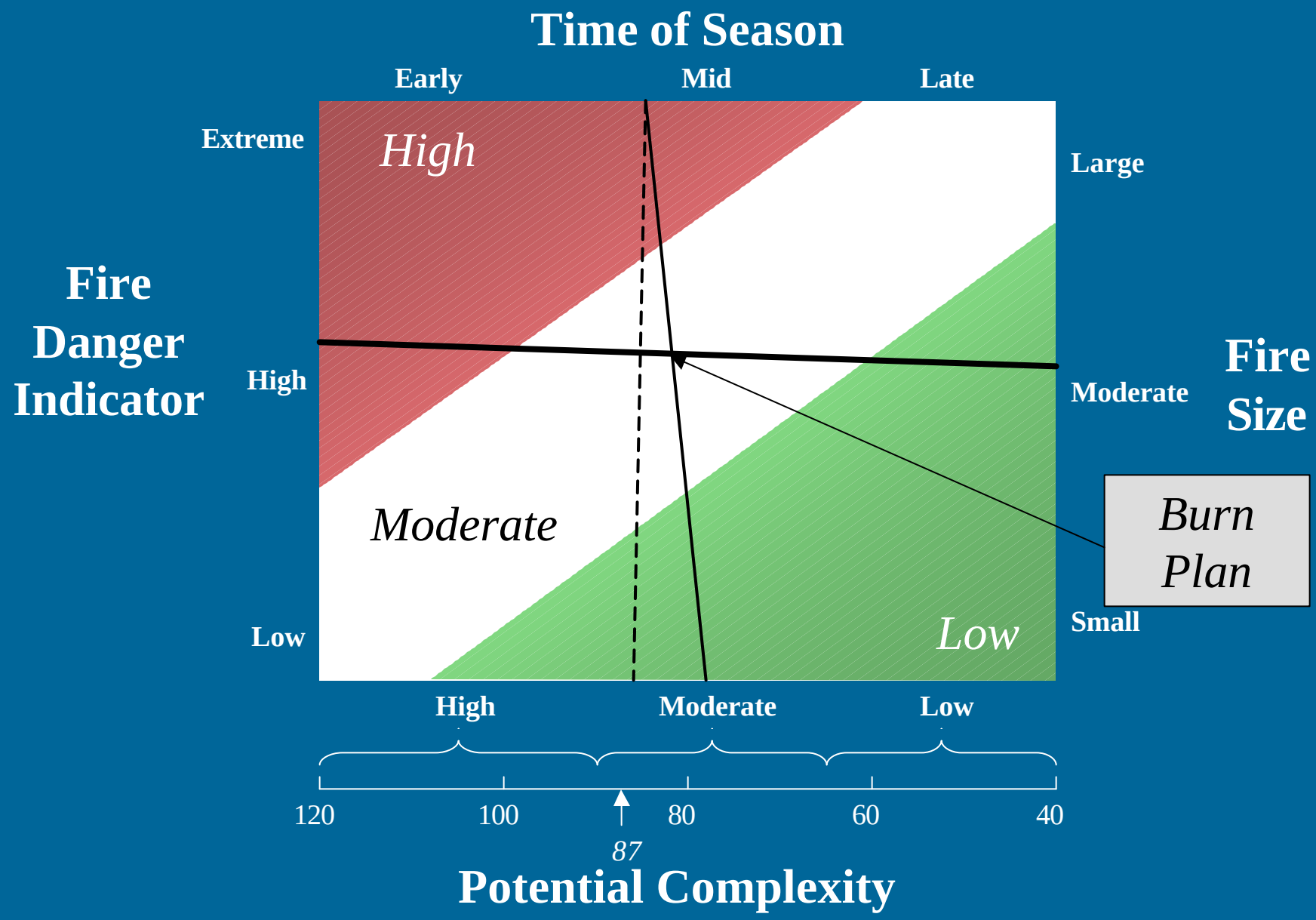
1. Burn Unit Description
2. Goals and Objectives
3. Range of Acceptable Results
4. Project Assessment
   - Complexity
   - Risk Assessment

Complexity Used to Estimate →

   - Relative Risk
   - Probability of Success
   - Consequences of Failure

5. Implementation Actions
6. Cooperation and Public Information

Relative Risk Comparison



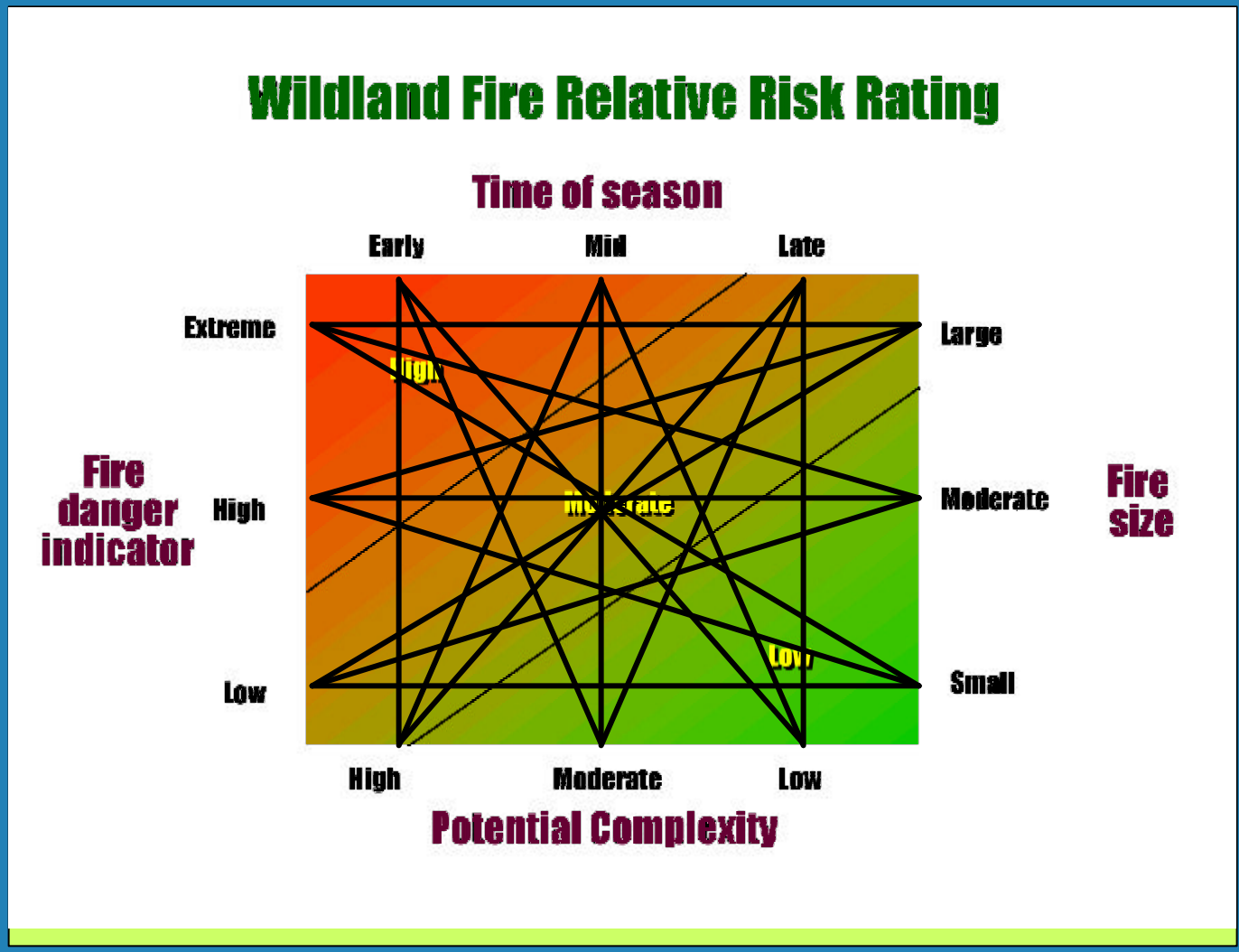
Relative Risk Result Distributions

There are 81 Possible "Intercept" Nodes

High = 16 (19%)

Moderate = 45 (56%)

Low = 20 (25%)



Boundary Condition Analysis

- **Relative Risk is Insensitive (i.e., Moderate) to Fire Size AND Fire Danger Indicator when**

  Complexity = High **Time of Season = Late**

- **If Time of Season = Late, Relative Risk Never Exceeds Moderate even when**

  Complexity = High
  Fire Size = Large
  Fire Danger Indicator = Extreme

<u>Time of Season</u> Appears to be the Dominate and Most Consequential Factor Determining "Relative Risk"

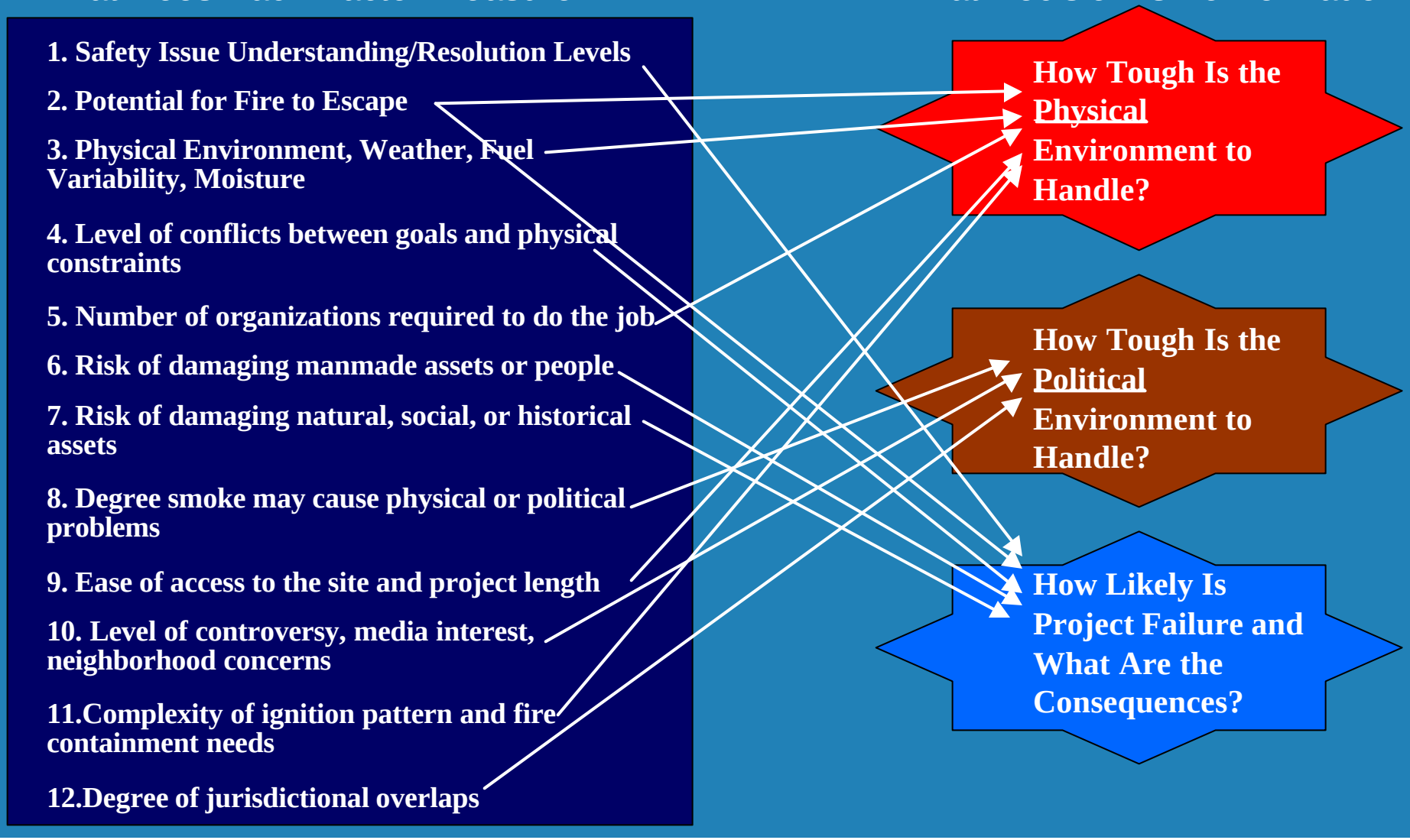
What's Wrong With Complexity?

Complexity: Defined by 12 Elements

What Can Complexity "Tell" A Decision Maker?

What Does Each Factor Measure?

What Decision Is To Be Made?



The Elements of Complexity

Technical Risks: **How Big of a Challenge is the Physical Environment to Handle? (Weight 47.5%)**

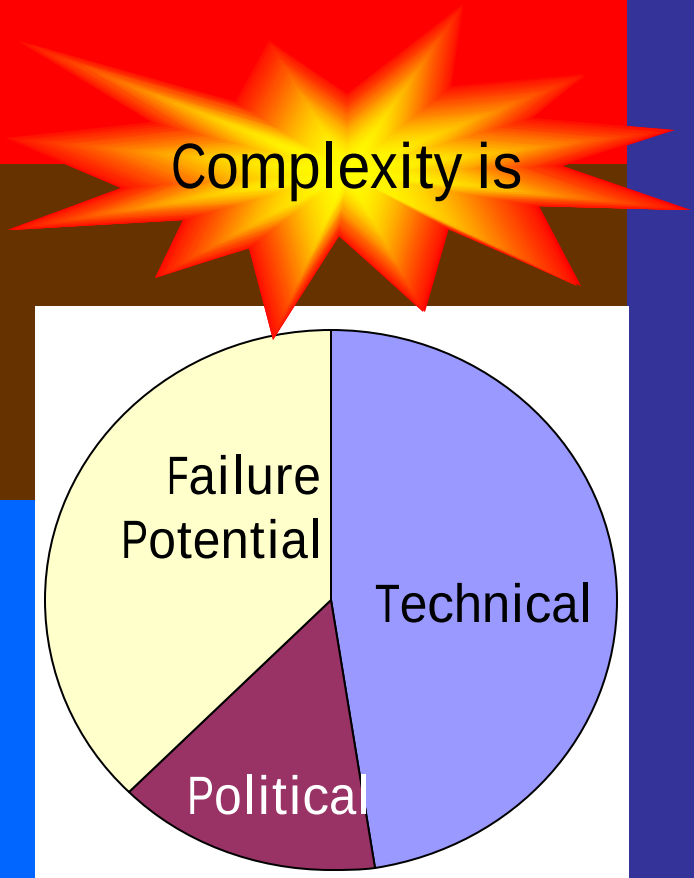
- **Potential for Fire to Escape**
- **Physical Environment, Weather, Fuel Variability, Moisture**
- **Ease of access to the site and project length**
- **Number of organizations required to do the job**
- **Complexity of ignition pattern and fire containment needs**

Political Risks: **How Big of a Challenge is the Political Environment to Handle? (Weight 15%)**

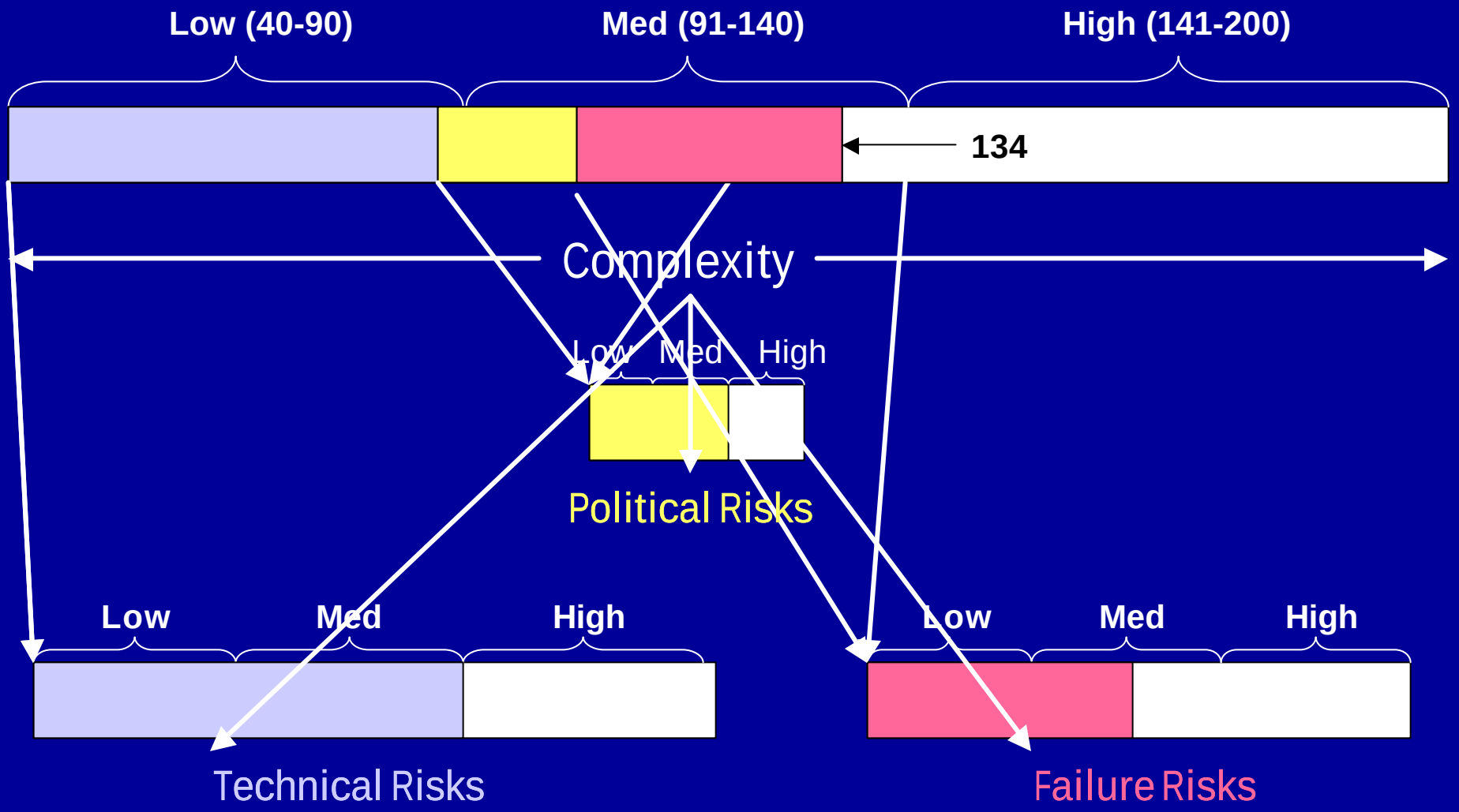
- **Degree smoke may cause physical or political problems**
- **Level of controversy, media interest, neighborhood concerns**
- **Degree of jurisdictional overlaps**

Failure Risks: **What is the possibility and consequences of something going wrong? (Weight 37.5%)**

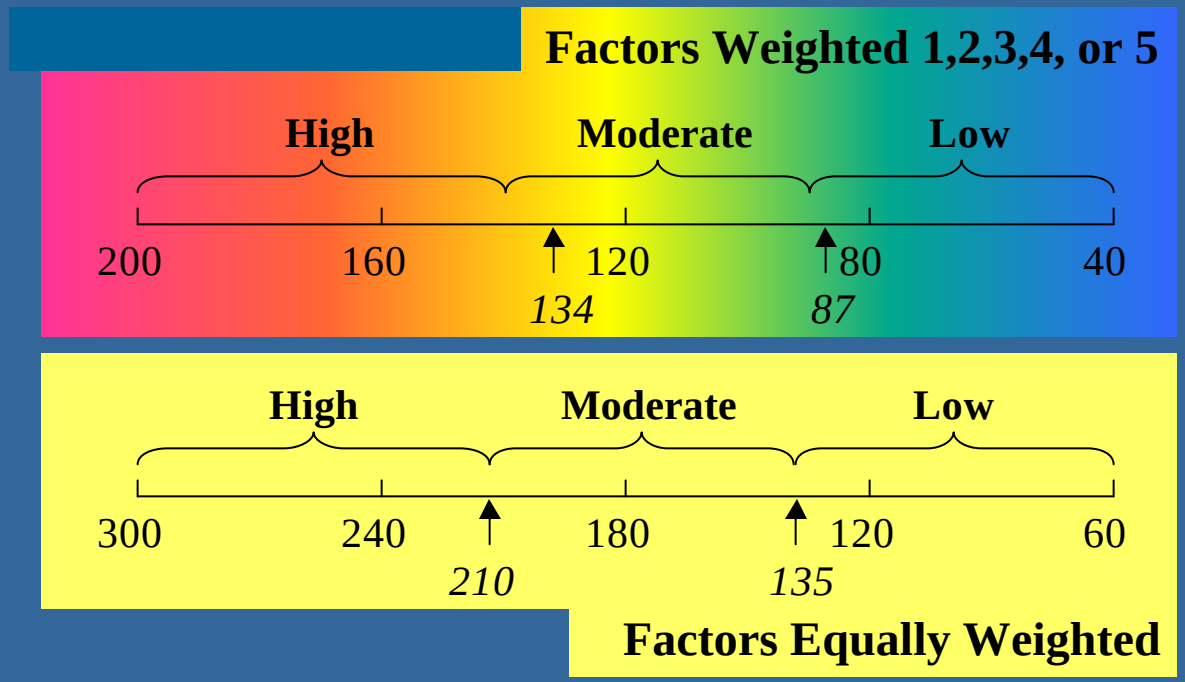
- **Risk of damaging manmade assets or people**
- **Risk of damaging natural, social, or historical assets**
- **Safety Issue Understanding/Resolution Levels**
- **Level of conflicts between goals and physical constraints**



Too Much Aggregation May Hide Significant Information



Complexity Weighting Factors Are Also Problematical



- The Weighting Factors Have Little or No Effect on the Resulting Complexity Scale Position
- The Approach Is Highly Aggregated -- Fine Structure Drivers Are Not Revealed
- Critical “Go/no Go” Factors May Be Hidden From the Decision Maker
- The User May Be Misled Into Believing the Method Has Enabled Her/Him to Make a Good Decision

CONCLUSION: Estimates of Complexity Were Not "Seriously Flawed"

"The calculations that went into the finding of complexity were seriously flawed… Had those been properly done, there would have been a larger background of personnel and support and review."

1. Complexity "Flaws" Had No Impact On Planning Quality
2. There Is No Documented Relationship Between "Complexity" Levels and "personnel and support and review"
3. Blaming "Complexity" As a Serious Flaw in the Planning and Implementation of the Prescribed Fire Cannot Be Supported